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(54) Title of the Invention:

# NONWOVEN COVERING FABRIC FOR MOISTURE ABSORBENT DISPOSABLE SANITARY ARTICLES

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# Specification

## 1. Title of the Invention

NONWOVEN COVERING FABRIC FOR MOISTURE ABSORBENT DISPOSABLE SANITARY ARTICLES

## 2. Claims

(1) For a nonwoven covering fabric that contains a surface active agent and is used for moisture absorbent sanitary articles that are soft and protect the skin, the nonwoven covering fabric is characterized in that it is processed with the surface finished with a processing treatment agent that contains a mixture of lanolin, an emulsifying agent and a surface active agent.

(2) The nonwoven covering fabric cited in Claim 1 characterized in that the processing treatment agent contains 0.08 to 0.35 g of lanolin per 1 $m^2$ of the nonwoven covering fabric.

(3) The nonwoven covering fabric cited in Claim 1 or Claim 2 characterized in that the nonwoven covering fabric comprises a polypropylene group fiber that is at least 65% by weight.

(4) The nonwoven covering fabric cited in any of Claim 1 through Claim 3 characterized in that the nonwoven covering fabric is a spunbond nonwoven fabric that comprises an endless filament.

## 3. Detailed Description of the Invention

[Field of Industrial Utilization]

The present invention relates to a nonwoven covering fabric that contains a surface active agent and is used for moisture absorbent sanitary articles that are soft and protect the skin.

[Prior Art]

This type of nonwoven covering fabric is well known and is used for the manufacture of moisture absorbent, disposable sanitary articles such as, for example, diapers for infants or adults, sanitary napkins and the like. These are composed of a moisture permeable material, such as for example, a nonwoven covering fabric, on the side that faces the body and a moisture absorbing layer that is provided with a nonpermeable material, such as, for example, a synthetic resin film on the back.

The moisture absorbent layer is composed of a well known material that is soft and appropriate for holding liquids by means of a dampening capability or its porosity. Cellulose wadding as well as finely distributed cellulose or absorbent tissue paper are suitable for this kind of material. The moisture permeable material rapidly drains the liquid that has been absorbed due to its porosity.

Nonwoven fabric is often employed as the covering material. In addition to rapidly processing the excreted substance, the nonwoven covering fabric is able to isolate the moisture absorbing layer containing liquid from the body surface.

As the nonwoven covering fabric, for example, rayon staple nonwoven fabric that has been bonded with a polymer bonding agent is used. Nonwoven fabric of a polyester group fiber that has been bonded with a bonding agent is also suitable. Both of these nonwoven fabrics usually include large amounts of a surface active agent and this is contained in an emulsion type bonding agent. In this way, these nonwoven fabrics have superior dampening properties. However, due to the fact that the nonwoven covering fabric is heavily saturated with a surface active agent, the reverse flow of the liquid that is held is promoted. In light of this, nonwoven fabrics that are made from synthetic fibers or filaments of polypropylene, polyester, and the like that are heat bonded are also well known. No more than an extremely small amount of surface active agent is included when the fabrics are manufactured and, in many cases, the fabrics are then provided with additional surface active agent in the finishing process in order to improve their dampening properties. These types of nonwoven fabric are sufficiently well known from documents and are cited in, for example, the patent specifications mentioned below. That is to say, in the specifications of United States Patents No. 3730184 and No. 3837343, the complete finishing processing of a nonwoven fabric with a surface active agent is cited, in the specification of United States Patent No. 3838692, the finishing processing of a region that is dispersed is cited, and in the specification of United States Patent No. 3934588, the treatment of the draining region for the liquid that has been absorbed and a specified region with a surface active agent is cited. In addition, in the specification of German Patent No. 2722860, the finishing processing of the entire surface of the nonwoven fabric in order to improve the moisture absorbing properties is cited.

[Problems of Prior Art To Be Addressed by the Invention]

In this manner, it is possible to use a suitable surface active agent and adjust the moisture permeability of the nonwoven covering fabric, rapidly move the liquid, and guarantee the necessary segregation of the liquid while preventing an undesirable reverse flow. However, when the skin of a person's body is in contact with moist nonwoven fabric for a long period of time, and, in addition, depending on the circumstances, even when only touching the surface of nonwoven fabric that has merely been finished and processed, the fact that allergic reactions are likely to occur can be considered to be a great weakness.

There are differences in the degree but observations have frequently been made of the several well known results that accompany cold soaking and this factor is still a marked drawback to past technologies. There is a concern that a portion of the sanitary article users will develop diaper dermatitis. According to articles published in reports by health organizations in the United States, 9.7% of all of the 0 to 2 year-old age group of infants that saw a doctor were brought to the doctor because of this problem ("Vital health statistics service," 13, No. 39, United States Department of Health, Education and Welfare, 1978). According to Jacobs ("Rashes in the area of the diaper," published in "North America Pediatric Clinic," 25, No. 29, 1978), this is a dermatitis that is primarily caused by contact irritation and one of the factors that can be given is cold soaking due to moisture.

Therefore, the present invention has as its object the improvement of the nonwoven covering fabric used for disposable sanitary articles that contains a surface active agent so that the skin is not damaged and, in addition, to especially reduce the bad effects on the surface of the skin caused by a moist nonwoven covering fabric that contains a surface active agent.

[Measures To Solve the Problems of Prior Art]

This object is achieved by the compositions of the nonwoven covering fabrics containing a surface active agent and by the finishing processing that are given in the Claims.

The nonwoven covering fabric has a processing treatment agent containing a mixture of a surface active agent, an emulsifying agent, and lanolin on the surface facing the body. Lanolin is, in the case of the present invention, a primary component of the processing treatment agent. Lanolin perfonns the two functions of adhering to the surface of the fibers and, at the same time, preventing the considerable delipidation of the skin in moist conditions. The fiber surface of the

nonwoven covering fabric is finishing processed so as to not damage the skin.

It is essential that the lanolin be combined with the surface active agent. By this means, the nonwoven covering fabric surface can be finishing processed so that, even when excretions from the body such as, for example, urine, are drained to the moisture absorbent layer that is below the nonwoven covering fabric, there are satisfactory hydrophilic properties, the nonwoven covering fabric maintains hydrophobic properties following the excretion treatment, and reverse flow does not occur.

It is known that, from among all of the natural materials, lanolin is the closest to the skin oil of human beings in its chemical composition and its physiological properties. For that reason, lanolin can substitute for the functions of the skin oil. By the inclusion of lanolin in the processing treatment agent, the softness of the skin is retained or the skin is softened.

Anhydrous lanolin can be obtained for cosmetics with various types of qualities. Although the lanolin already has an extremely low average allergy rate of approximately 5.5 people in a population of one million, there are also products that are specially refined and have small amounts of cleansing agents and/or have had agricultural chemical residues and free fatty acids partially or completely eliminated. By this means, the allergy rate is reduced to a de facto zero. The commercially available "Lanolin DAB 8" comprises 68 parts by weight of wool oil, 20 parts by weight of water, and 15 parts by weight of viscous paraffin.

Items manufactured from staple fabric are suitable as the nonwoven covering fabric and spunbond nonwoven fabric comprising endless filament is also suitable. Staple or filament comprising 65 percent by weight of polypropylene is preferable. In the case of spunbond nonwoven fabric, items manufactured in accordance with the method cited in the specification of German Patent No. 3151322 are especially suitable.

The processing treatment agent comprising a mixture of lanolin, an emulsifying agent, and a surface active agent is applied to the nonwoven fabric by spraying, padding or slop padding. Coating can also be done for the fiber surface that does not comprise a direct component of the nonwoven fabric surface and, with regard to the amount of coating per 1 $m^2$ of the nonwoven fabric, looked at in absolute terms, it is possible to have different distribution amounts. However, the disparities related to this point are not important from a functional technology standpoint because said nonwoven fabric is thin. Next, the nonwoven fabric is dried. The mixture preferably contains 0.08 to 0.35 $g/m^2$ of lanolin. It has been proven that, for many

applications, 0.15 to 0.25 per 1 $m^2$ of the nonwoven fabric is an optimum amount.

[Preferred Embodiments]

It is preferable that the effectiveness of the nonwoven covering fabric in accordance with the present submission containing a surface active agent and lanolin be derived by the below mentioned method known as a "runoff test."

Runoff Test

This method is based on carrying out the detection of the amount of runoff at an angle of 45° to the vertical of synthetic urine that appears in a layer of the material to be tested under specific conditions. The material is furnished with a standard moisture absorbent lining.

A 50 ml buret having an inside diameter cross-section area of 1 $cm^2$ is used. The buret is connected through a flexible tube to a plexiglass nozzle with which a flow rate of 40 ± 2 ml per minute is maintained. A drainage nozzle is fixed parallel to the surface of the nonwoven fabric.

The measurements of the sample are carried out under conditions adjusted to 21°C ± 2°C a relative humidity of 65%. The synthetic urine is adjusted to the identical temperature.

The standard moisture absorbent lining is placed in the test apparatus and covered with the nonwoven covering fabric sample. Light pressure is applied and both layers are brought into contact. The drainage nozzle is attached above the sample and the surface is coated with 30 ml of synthetic urine while the time is measured. The flow rate is 40 ml ± 2 ml. The liquid flow that initially reaches the surface is absorbed by five plies of filter paper under the measuring device.

After the use following the initial stage, all of the runoff liquid is absorbed by the moisture absorbent lining. Following the completion of the test, the liquid that initially flowed into the filter paper is measured by the computation of the amount of the difference.

The composition of the synthetic urine is as follows.

| | |
|---|---|
| Urea | 388.00 g |
| Sodium chloride (NaCl) | 159.08 g |
| Magnesium sulfate ($MgSO_4 \cdot 7H_2O$) | 22.116 g |
| Calcium chloride ($CaCl_2 \cdot 2H_2O$) | 12.416 g |
| Potassium sulfate ($K_2SO_4$) | 39.567 g |

| | |
|---|---|
| Amaranth (naphtholate) | 2.00 g |
| Isooctylphenol polyethoxy ethanol having about 40 ethoxy units | 1.00 g |
| Distilled water | 18.93 L |

Rewetting Test

This test is based on the detection of the weight, under standard conditions, of the amount of synthetic urine absorbed during a specified period of time by five layers of filter paper from an absorbent liner with the interposition of a dampened nonwoven covering fabric sample under a prescribed load.

The test is carried out in a room that has been adjusted to conditions of 21°C ± 2°C and 65% relative humidity. 30 ml of synthetic urine that has had its temperature adjusted to room temperature is poured through a funnel onto a nonwoven covering fabric that has been arranged horizontally affixed across a standard moisture absorbent lining.

The funnel is removed after the liquid is absorbed and the moistened locations are covered with a square plate that is 100 mm long on a side. A cushion of a polyurethane layer that is covered with a film is attached to the rear surface of the plate, which is loaded for three minutes with a 3,190 g weight.

Next, the plate with the attached cushion is removed and replaced with the five layers of filter paper that were weighed in advance. Next, an identical 100 $cm^2$ surface is again covered by a 3,190 g weight. After an additional two minutes, the amount that has been absorbed by the filter paper is derived by the computation of the amount of the difference.

The runoff method and the rewetting method discussed above are applied to the preferred embodiments described below.

Preferred Embodiment 1

A spunbond nonwoven fabric having an area specific weight of 17 $g/m^2$ comprising a polypropylene group fiber was manufactured in accordance with the method cited in the specification of German Patent No. 3151322 and this was sprayed and finishing processed with a processing treatment agent containing lanolin. Prior to the spraying, the nonwoven fabric did not include any finishing processing. The amount of wet coating of the processing treatment agent

was 24.5 g/m$^2$. The nonwoven fabric that was finishing processed was dried at a temperature of 80°C. The processing treatment agent was produced as follows.

| | |
|---|---|
| A Phase | |
| Lanolin DAB 8 | 10 g/L |
| Cetyl alcohol | 1.5 g/L |
| B Phase | |
| Alkali soap | 3.0 g/L |
| Isooctylphenol polyethoxy ethanol having about 10 ethoxy units | 10 g/L |
| Water | 975.5 g/L |

The A phase and the B phase are heated separately to 70°C to 75°C. After the B phase has been poured into the A phase while stirring, the mixture is cooled to room temperature. In this manner, an extremely fine stable emulsion is produced. When the emulsion is left to stand for a long period of time without stirring, the phases separate but the phase separation can be eliminated by stirring for a short period of time.

The amount of solid coating is 0.24 g per 1 m$^2$ of lanolin. The finishing processed nonwoven covering fabric has an extremely soft feeling that does not damage the skin compared to the identical material for which finishing processing has not been done.

The following values were obtained for the dry characteristic tests.

| | | |
|---|---|---|
| Runoff | 0.00/0.12/00.17 | $\bar{x}$ (mean value) = 0.10 |
| Rewetting | 0.12 g | |

This material is especially suitable for infant diapers.

Preferred Embodiment 2

A spunbond nonwoven fabric comprising a polypropylene group fiber and having an area specific weight of 23 g/m$^2$ was sprayed and treated with a lanolin group processing treatment

agent having the same composition as that of preferred embodiment 1. However, it should be noted that a soap containing alkali was not included.

The processing treatment agent, accordingly, had a neutral pH and was prepared as follows.

| | |
|---|---|
| A Phase | |
| Lanolin DAB 8 | 10 g/L |
| Cetyl alcohol | 1.5 g/L |
| Stearic acid | 6 g/L |
| B Phase | |
| Triethanol amine | 1 g/L |
| Isooctylphenol polyethoxy ethanol having about 10 ethoxy units | 10 g/L |
| Water | 200 g/L |
| C Phase | |
| Water | 771.5 g/L |

After the A phase and the B phase are heated separately to 70°C to 75°C, the B phase is stirred and mixed a little bit at a time into the melted fat. After stirring and cooling, the mixture is poured into the C phase. The pH value is 7.1.

The wet coating amount of the processing treatment agent on the nonwoven covering fabric is 23 $g/m^2$ and the amount of contained lanolin for the nonwoven covering fabric is 0.23 $g/m^2$.

The measured values for the finishing processed nonwoven fabric are as follows.

| | | |
|---|---|---|
| Runoff | 0/0.01/0 | $\bar{x} = 0.003$ |
| Rewetting | 0.12 g | |

Preferred Embodiment 3

A polypropylene group spunbond nonwoven fabric manufactured in accordance with the method cited in preferred embodiment 1 and weighing 17 g/m$^2$ was coated with a processing treatment agent by padding and then dried. The lanolin group processing treatment agent was obtained as follows.

| | |
|---|---|
| A Phase | |
| Lanolin P95 (commercially available maximum purity lanolin from the Westbrook Lanolin Company) | 40 g/L |
| Ethoxy wool oil based emulsifying agent | 20 g/L |
| Cetyl alcohol | 6 g/L |
| B Phase | |
| Isooctylphenol polyethoxy ethanol having about 10 ethoxy units | 20 g/L |
| Water | 914 g/L |

The A phase and the B phase are heated separately to about 70°C and then the B phase is stirred and mixed into the A phase. The mixture is stirred and cooled. When the emulsion has become about 50°C, it is homogenized with an ultra-turrax for about ten minutes and, following that, is again cooled.

Both surfaces of the nonwoven covering fabric are wet coated with a 12 g/m$^2$ amount. The amount of contained lanolin is 48 g/m$^2$.

The measured values are as follows.

| | |
|---|---|
| Runoff | $\bar{x} = 0.13$ |
| Rewetting | 0.10 g |

Preferred Embodiment 4

The treatment was done under the conditions cited in preferred embodiment 2. However, it should be noted that the processing treatment agent contained an isopropyl myristate component. The high grade fatty acids and monovalent alcohol ester have a low surface tension and, for that reason, form as a thin film on the skin making it possible for them to easily penetrate the skin, aiding or facilitating the absorption of the lanolin. The processing treatment agent is produced as follows.

| | |
|---|---|
| A Phase | |
| Lanolin P95 | 30 g/L |
| Isooctylphenol polyethoxy ethanol | 20 g/L |
| Cetyl alcohol | 6 g/L |
| Isopropyl myristate | 10 g/L |
| B Phase | |
| Isooctylphenol polyethoxy ethanol having about 10 ethoxy units | 20 g/L |
| Water | 914 g/L |

The production of the emulsion is carried out by means of the method cited in preferred embodiment 3.

The processing treatment agent is applied by a padding machine. The wet coating amount is 6.3 g/m$^2$. The amount of contained lanolin is 0.19 g/m$^2$. The spunbond nonwoven fabric is then dried. The measured values are

| | | |
|---|---|---|
| Runoff | 0.12/0.00/0.13 | $\bar{x} = 0.08$ |
| Rewetting | 0.11 | |

[Advantageous Result of the Invention]

In accordance with the present invention, as has been discussed above, the nonwoven fabric that is used as a covering material has the advantageous result that the material is superior

compared to the past in that the damage done to a person's skin is extraordinarily low.

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